

Diese Form zeigt die größten Maße für die Gesamtschädellänge. Das auffallendste Merkmal ist die scharf ausgeprägte Supraorbitalleiste, die in einer gestreckten — nicht gebogenen — Linie schräg von vorn nach hinten verläuft. Ferner hat diese Form mit 4,3 mm die größte Länge der oberen Molarenreihe unter den 4 Fernando-Poo-Vertretern (vergl. Abb. 2 und Tab. 1). Die oberen Incisivi stehen schwach opisthodont. Das Rostrum ist relativ lang, aber nicht übermäßig breit.

Die 2 Funde deuten darauf hin, daß *aeta* auf Fernando Poo möglicherweise auf die Montanregion beschränkt ist, jedoch hier sowohl in der unteren als auch in der oberen Stufe vorkommt. In der erstgenannten lebt sie zusammen mit Form b, in der letzteren zusammen mit Form b und c.

Abschließend gebe ich hier noch einmal eine vergleichende Gegenüberstellung einiger wichtiger unterschiedlicher Körpermerkmale (Tabelle 2), die ich bei den vier Formen von Fernando Poo festgestellt habe:

Zusammenfassung

Fernando Poo wird von vier *Hylomyscus*-Formen bewohnt, deren unterschiedliche Körper- und Schädelmerkmale gegenübergestellt werden. Die ausschließlich im Niederungsgebiet gefundene Form wird als *H. alleni alleni* fixiert. *H. aeta* liegt nur in zwei Exemplaren aus der unteren und oberen Zone des Montangebietes vor. Die systematische Eingruppierung der ebenfalls auf die Montangebiete beschränkten übrigen zwei Formen muß zunächst dahingestellt bleiben.

Summary

The differing body and skull characteristics of the four forms of *Hylomyscus* inhabiting Fernando Poo are compared. The form confined to the low ground is considered as representing *H. alleni alleni*. Only two specimens of *H. aeta* have been found from the lower and upper montane regions respectively. The affinities and the proper classification of the two remaining forms, which are likewise confined to the montane regions must, for the time being, remain in doubt.

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A Note on *Tadarida* (*Chaerephon*) *bivittata* Heuglin

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Eingang des Ms. 3. 3. 1965

Abstract: A reexamination has been made of the original specimens of the little-known bat *Tadarida* (*Chaerephon*) *bivittata* Heuglin. Detailed external measurements and skull measurements are published for the first time. Further specimens from Kenya, Uganda and Northern Rhodesia (Zambia) are also reported on. It is concluded that the species is a very distinct one but that the colour pattern, particularly as regards the spotting or striping from which the species takes its name, is very variable individually.

HEUGLIN (1861) described in some detail, under the name *Nyctinomus bivittatus*, three specimens preserved in alcohol of a molossid bat from the neighbourhood of Keren, Eritrea. One of the distinguishing features was the presence on the crown of two white stripes or groups of white spots, with a varying amount of white flecking on the shoulders and back and elsewhere. No characters sufficient to indicate affinity of the species with either of the subgenera *Chaerephon* Dobson or *Mops* Lesson as later defined by THOMAS (1913) appear in the description. In a postscript (p. 18, under the lapsus *Nycticejus bivittatus*) HEUGLIN referred to further specimens, some of which showed a reddish brown colour variation, distinct from the normal dull amber

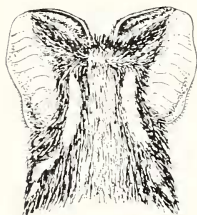


Fig. 1. Dorsal view of head and neck of ♂ *Tadavida bivittata* from Nairobi, Kenya, 29. III. 1955, collected by Dr. LE PELLEY; Coryndon Museum No. 5551

brown, allied to an almost complete absence of the white markings as described originally on p. 13. HEUGLIN gave few details of the teeth, and none of the skulls, which were not removed from the specimens. Later writers have added little to our knowledge of HEUGLIN's new species. FITZINGER (1870) did little more than repeat the original description, and added to the range, without further explanation, "Süd-Ost Afrika". DOBSON (1878) gave a brief diagnosis based on his own examination at Stuttgart of what he refers to as the type of the species. His description of the pattern of spotting differed from HEUGLIN's in describing the spots as grey rather than white. He also considered the species to be very closely allied to *Nyctinomus plicatus* of India, of which, in his view, it might be considered the African representative. HEUGLIN (1877) gave a further brief diagnosis of the species under the generic name *Dysopes*, and indicated the range of the species more closely as from the Anseba River as far as Keren, and also by the Atirba stream (which we have not located).

MATSCHIE (1895) listed the species from two Tanganyika localities, without comment, but the brief description given of his specimens raises doubt of the identification. DE WINTON (1901) said of *bivittata*, which he had not seen "From the description

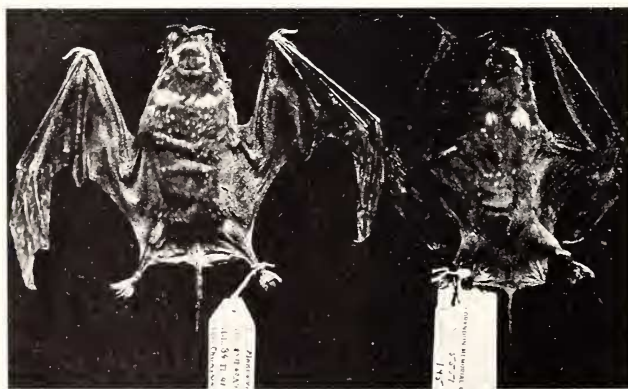


Fig. 2. Photo of dorsal aspect of ♀ from Makueni, Kenya, Coryndon Museum coll. No. 5110 (left) and of ♂ from Nairobi, Coryndon Museum coll. No. 5551 (right)

this would appear to be very nearly allied to *N. angolensis*, as are also *Dysopes hepaticus* Heugl., and *D. talpinus* Heugl." SENNA (1905) in a report on Eritrean bats, briefly noted MATSCHIE's report of the species in German East Africa (= Tanganyika), and quoted also DE WINTON's suggestion of its possible affinity with *N. angolensis* Peters. He did not refer to any further specimens. THOMAS (1913) included *bivittata* among the African mem-

bers of the subgenus *Chaerephon* as defined by him. G. M. ALLEN (1914) listed two bats from El Garef on the Blue Nile as probably representing HEUGLIN's species, but as will be seen below, there are grounds for doubting this identification. G. M. ALLEN (1939) listed *bivittata* as a species of the subgenus *Chaerephon*, but presumably following DE WINTON, included as synonyms two other names of HEUGLIN's, *Dysopes hepaticus* 1864 and *D. talpinus* 1877, whose status will be discussed below. Lastly, one of us, D. L. HARRISON (1961) has listed under this name a number of specimens from various localities in the Kenya highlands in the collection of the former Coryndon Museum (now the National Museum), Nairobi.

Since it appears that there has been some uncertainty in the past with regard to the taxonomic status of *bivittata*, and since there have been no recent accounts of its characters and geographical distribution, we concluded that a careful examination of the syntypes and any other material was long overdue.

Thanks to the cooperation of Dr. A. KLEINSCHMIDT of the Zoology Department of the Staatliches Museum für Naturkunde, Stuttgart, we have been enabled to make a detailed examination of the three spirit specimens from Keren on which HEUGLIN based his new species. The skulls have been removed and cleaned, so that it is now possible to add considerably to the data bearing on the systematic position of the species.

The three specimens may be considered syntypes. DOBSON (1878) referred to his examination of the type, an adult male, but since there are two adult males, and the external measurements of neither agree exactly with those given by DOBSON, and since also none of the specimens bear any indication as type, it seems best not to attempt to select a lectotype but to continue to regard the three as syntypes. Full external measurements were taken of the wet specimens, and on drying out temporarily full notes were taken on colour and pattern. The specimens have been now labelled A, B and C for reference.

The external characters common to the three are: (a) size large for the subgenus *Chaerephon*, forearm 49.5 to 51; (b) conjoined ears; (c) in males very short and inconspicuous interaural tufts; (d) large almost rectangular antitragal lobes and very

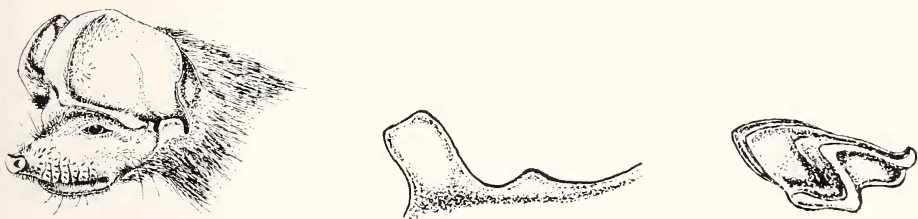


Fig. 3. (left and middle). Lateral view of head of syntype, ♂, specimen B., from Keren, Eritrea, with left tragus; Stuttgart Museum. — Fig. 4 (right). Left m³ of syntype, specimen B.

small rectangular tragi, with a distinct small angular projection behind their bases; (e) upper margin of rhinarium corrugated; (f) general colour above dark brown, below with chin almost naked, succeeded by a dark brown throat clearly distinguished from the greyish-brown chest and abdomen, the individual hairs being dark brown with greyish tips; (g) lateral flank band below wing edge dark brown; (h) all wing and tail membranes dark brown. In the important matter of the pattern of white stripes and/or spots, the individual variation requires separate description of each of the three specimens.

Specimen A, adult male. On each side of the crown, parallel to the upper base of the ear, is a faint white line, succeeded closely by a few small white spots. A few

Specimen number and locality	Sex, age.	HB	TL	HF	E	FA	Metacarpal 3, phal. 1, 2, 3.	Metacarpal 4, phal. 1, 2, 3.	Metacarpal 5, phal. 1, 2, 3.	Skull greatest length
A, Keren, syntype	♂ ad.	70	43	12	18.8	50	47, 23, 20, 9.	46, 19, 13, 3	26, 16, 7, 2	20.5
B, Keren, syntype	♂ ad.	66	41	11	19	51	48, 24, 21, 10	46, 18, 13, 3	25, 16, 6, 1	20.3
C, Keren, syntype	♀ ad.	71	41	12.5	17	49.5	47, 22, 18, 10	45, 18, 13, 2	25, 15, 6, 1	19.8
CMC 5111, Makueni	♂ ad.					49				19.9
CMC 5112, Makueni	♀ ad.					51				
CMC 5113, Makueni	♀ ad.					49				19.5
CMC 5114, Makueni	♀ ad.					49.5				19.5
CMC 5110, Makueni	♀ ad.					51				19.7
DLH 1.3197, Nairobi	♀ ad.	53.5	40.5	11.5	16.3	48.7	46, 20, 19, 7.	46, 17, 11, 2.	28, 14, 5, 2.	19.6
DLH 1.2338, Abercorn, N. Rhod.	♂ ad.	74	38	11.3	19	51	51, 22, 20, 9	49, 18, 12, 3.	30, 15, 5, 2	20.5
CMC 5551, Nairobi	♂ ad.					51				
CMC 6298, Mt. Elgon	♂ ad.					46				
CMC 124, Ngong	♀ ad.					46				
CMC 1528, Yala R.	♂ ad.					46				
CMC 5288, Moroto	♂ ad.					50				

small white spots dorsally tending to be grouped towards the flanks rather than the mid-dorsal region. A few very faint white spots on the underside of the shoulder below the anterior angle of the wing.

Specimen B, adult male. On either side of the crown an indefinite white stripe, not sharply defined, about 8 mm. long and 2 mm. wide, each succeeded closely by a group of about six brighter white spots on the side of the neck. A few more small white spots scattered on the back, with a distinct tendency towards an irregular grouping on each flank close to the wing roots. A further grouping of very small white spots just anterior to and below the wing root on the shoulder.

Specimen C, adult female. Pair of crown stripes clearly defined (the hairs are white to the base). No adjoining spots, but small white spots profusely scattered all over back from shoulders posteriorly. Slight spotting below forearm root.

It will be noted that in no case are spots found on the posterior part of the neck

Condylolabial length.	Zygomatic breadth.	Mastoid breadth.	Braincase breadth	Interorbital constriction.	Lachrymal breadth	Braincase depth	Palatal length.	Upper toothrow c-m ³	Breadth m ³ -m ³	Specimen number and locality
19.3	12.7	11.6	10.7	4.7	7.3	9.0	8.7	7.7	9.1	A, Keren, syntype
19.5	12.5	11.8	10.3	4.5	7.0	9.2	8.6	7.7	9.0	B, Keren, syntype
18.8	12.0	11.4	10.1	4.4	7.0	9.0	8.5	7.5	8.7	C, Keren, syntype
18.9	12.2	11.1	10.0	4.2	5.8	8.2	8.4	7.7	9.0	CMC 5111, Makueni
	12.2			4.3	5.7		7.7	7.4	8.7	CMC 5112, Makueni
18.4	12.3	11.5	9.7	4.4	6.0		7.6	7.5	8.7	CMC 5113, Makueni
18.2	12.1	11.1	9.9	4.5	6.0		7.7	7.1	8.7	CMC 5114, Makueni
18.6	12.2	11.2	10.4	4.5	6.0		7.9	7.0	8.4	CMC 5110, Makueni
18.2	11.9	11.2	10.3	4.3	6.5		8.0	7.5	8.7	DLH 1.3197, Nairobi
19.4	12.8	11.9	10.5	4.6	7.8		8.2	7.8	9.8	DLH 1.2338, Abercorn, N. Rhod.
										CMC 5551, Nairobi
										CMC 6298, Mt. Elgon
										CMC 124, Ngong
										CMC 1528, Yala R.
										CMC 5288, Moroto

itself, so that there is an interruption between the markings of the crown and/or anterior neck and the markings on the shoulders and/or dorsal region.

In cranial and dental characters the three skulls show great uniformity. They are characterised by a comparatively short rostrum, an elevated frontal region bearing a slight but clearly defined sagittal crest, a well-developed supraoccipital region with strong ridges, prominent lachrymal projections, and palate with small anterior vacuities in the premaxillae. The small upper premolar is in the toothrow clearly separating the larger premolar from the canine, and the upper m³ has a well developed third commissure. The overall breadth across m³-m³ is in each case slightly greater than the c-m³ length. The basisphenoid pits are well marked but rather shallow, with a rather broad median basisphenoid ridge between them. In general features the skull, as well as the teeth, fit quite well the accepted view of the subgenus *Chaerephon*, although the rather open palatal vacuities tend to approach the more open type found in the



Fig. 5. Skull of syntype, specimen B. Dorsal, ventral, lateral with mandible. Scale = cm and mm

typical subgenus *Tadarida*, thus suggesting that perhaps it may eventually be found difficult to maintain separation of the subgenus *Chaerephon* so far as skull characters are concerned.

Measurements. External and cranial measurements of the syntypes and of further specimens are given in the table.

We have been able to examine a further twelve skins and seven skulls of *bivittata* from localities in Kenya, Uganda and Zambia. The most useful group consists of ten skins and five skulls made available to us by the willing cooperation of Mr. JOHN WILLIAMS of the National Museum, Nairobi (formerly the Coryndon Museum). Five of these are skins with skulls from Makueni, Kenya (about $1^{\circ} 50'S$, $37^{\circ} 48'E$.), one skin each from Nairobi,

Elgon, all in Kenya, and one from Moroto, South Kavirondo, Ngong Hills, Yala River, Mt. Uganda. Two further examples in the private collection of one of us, (D.L.H.), are from Nairobi and Abercorn, Zambia, respectively.

Examination of these specimens confirms the general characters of the species as regards size, general body and membrane colour, and cranial and dental characters, but shows that there is great variation in the spotting pattern. Of the five Makueni skins, all have post-aural stripes or spots developed to some extent, four have flank spots, two have spots below the shoulder, and two have in addition some thoracic spotting. The Nairobi specimen No. 5551 (fig. 1, and 2, right), has on each side of the crown a well developed postaural stripe, succeeded by some spots on the side of the neck, plus a few dorsal and some ventral spots. The Mount Elgon specimen has four nape spots only, the Ngong skin three nape spots only, the Yala River skin two nape spots on one side, three on the other, and a few spots under one shoulder. All the specimens have a generally sombre umber-brown pelage. The two specimens in the collection of D. L. HARRISON have a much brighter reddish-brown pelage; the Nairobi specimen has a few postaural spots and a few thoracic, as has also the Zambia specimen. All the skulls available from the series listed above agree closely with the syntype skulls in all essentials.

It will be seen that in one of the most distinctive features (at its maximum development) in this species, the pattern of white spotting, there is very great individual variation. There is no suggestion, on the available evidence, that this variation is linked with sex, age or locality. It should be remembered that HEUGLIN himself (1861:18) referred to further specimens as almost entirely lacking the crown pattern („bei welchen die Streifen hinter den Ohren fast ganz verwischt sind“). But even when

reduced to a minimum, the pattern is retained to some degree on the crown although obsolete elsewhere. It may incidentally be noted that the occurrence of some degree of haphazard white spotting dorsally in some species of the genus *Tadarida* (*sensu lato*) is not unknown. For instance, in the British Museum collection there are to be found some scattered small white spots on the shoulders and back in a small proportion of the skins of the following; *Tadarida (Chaerephon) pumila* (including *limbata*), *T. (Mops) condylura niveiventer*, and *T. (Mops) midas*. In none of these could the spotting be taken for that of *bivittata*, since that always (so far as available material shows) includes a crown component, and within the subgenus *Chaerephon* the species under review may be readily distinguished from other species additionally by its size or skull form or both. *Tadarida (Chaerephon) aloysii-sabaudiae* Festa, recently redescribed in great detail by LANZA and HARRISON (1963), although of approximately similar size, differs widely from *bivittata* in many details of structure and particularly in its long narrow rostrum and interorbital region.

Finally, from such details as are available in HEUGLIN's scanty descriptions of *Dysopes hepaticus* and *D. talpinus* it seems unlikely that either of these names can be synonymised with *bivittata* as G. M. ALLEN allocated them. It also seems that the two bats from El Garef, Blue Nile, listed by G. M. ALLEN (1914) as *Chaerephon bivittatus* Heuglin, are not in fact representatives of that species. Not only the small size (forearms 42 and 44) but the position of the first upper premolars indicate a wide difference from true *bivittata* as here defined.

Acknowledgements

We are much indebted to Dr. A. KLEINSCHMIDT of the Staatliches Museum für Naturkunde in Stuttgart for kindly allowing us to examine the syntypes; also to Mr. JOHN G. WILLIAMS of the National Museum, Nairobi, for his kindness in providing further material, as well as to Mr. T. S. JONES for his help in arranging the loan of the Nairobi material; and to Mrs. PAMELA HARRISON who prepared the photographic plates on our behalf.

Summary

Study of the syntypes and additional material indicates that *Tadarida (Chaerephon) bivittata* Heuglin is a distinct species ranging from Eritrea to Kenya, Uganda, possibly Tanzania (Tanganyika) and to Zambia (Northern Rhodesia). The forearm size range is from 46 to 51, the greatest skull length from 19.5 to 20.5.

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Die Geburt bei Flughunden der Gattung *Rousettus* Gray (Megachiroptera)¹

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Eingang des Ms. 26.2. 1965

Eine zuverlässige Beschreibung über die Geburt einer Fledermaus gibt P. BELON bereits im Jahre 1555. Er berichtet, daß das Muttertier bei der Geburt hängt, daß es das Junge aus den Eihäuten befreit, die Nabelschnur durchbeißt und schließlich die Nachgeburt auffrißt. Seit dieser Zeit wurden über das Fortpflanzungsverhalten der Fledermäuse eine größere Anzahl von Einzelbeobachtungen gemacht, die WIMSATT (1960) und SLIJPER (1960) in vergleichender Weise zusammenstellten. Nach der Körperhaltung der gebärenden Fledermäuse lassen sich demnach im wesentlichen zwei Typen unterscheiden: 1. Aufrechte oder horizontale Körperhaltung und 2. Geburt in normaler Ruhestellung.

Aufrechte oder horizontale Körperhaltung

Die normale Hängelage wird um 90 oder 180 Grad verändert; die Daumenkrallen dienen zur Verankerung; die Schwanzflughaut wird bauchwärts als Auffangtasche für das ankommende Junge eingeschlagen. Diesen Typ vertritt die heimische Langohr-Fledermaus (*Plecotus auritus*). Eine vollständige Geburt wurde von EISENTRAUT (1936, 1937) beschrieben. Die Ausdehnung des Uropatagiums während der Geburt wurde auch bei *Nyctalus noctula* (DANIELL, 1835) und bei der nordamerikanischen Langohr-Fledermaus *Corynorhinus rafinesquei* (PEARSON et al., 1947) beobachtet. In ähnlicher Weise verhalten sich auch andere Arten aus der Familie der *Vespertilionidae* (ENGLÄNDER, 1952, MOHR, 1933, ORR, 1954, ROLLINAT und TROUESSART, 1896, ROTH, 1957, RYBERG, 1947, SHERMAN, 1930, WIMSATT, 1945, 1960).

Die Geburt in normaler Ruhestellung

Daß die Geburt auch in hängender Stellung erfolgen kann, beobachtete WHITAKER (1905) bei einem Abendsegler (*Nyctalus noctula*); über die gleiche Körperhaltung berichten GOGUYER und GRUET (1957) bei *Myotis emarginatus*. Bei den folgenden Arten aus anderen Familien vollzog sich die Geburt ebenfalls in normaler Ruhestellung:

¹ Alle Aufnahmen vom Verfasser.